

Cell Structure and Function ▪ Section Summary

The Cell in Its Environment

Key Concepts

- How do most small molecules cross the cell membrane?
- Why is osmosis important to cells?
- What is the difference between passive transport and active transport?

The cell membrane is **selectively permeable**, which means that some substances can pass through it while others cannot. Oxygen, food molecules, and waste products all must pass through the cell membrane. Substances that can move into and out of a cell do so by one of three methods: diffusion, osmosis, or active transport.

Diffusion is the main method by which small molecules move across the cell membrane. Diffusion is the process by which molecules tend to move from an area of higher concentration to an area of lower concentration. The concentration of a substance is the amount of the substance in a given volume. Diffusion is caused by molecules moving and colliding. The collisions cause the molecules to push away from one another and spread out. Molecules diffuse through the cell membrane into a cell when there is a higher concentration of the molecules outside the cell than inside the cell.

The diffusion of water molecules through a selectively permeable membrane is called **osmosis**. **Because cells cannot function properly without adequate water, many cellular processes depend on osmosis.** In osmosis, water molecules move by diffusion from an area where they are highly concentrated through the cell membrane to an area where they are less concentrated.

The movement of dissolved materials through a cell membrane without using cellular energy is called **passive transport**. Diffusion and osmosis are both types of passive transport. When a cell needs to take in materials that are in higher concentration inside the cell than outside the cell, the movement of the materials requires energy. **Active transport** is the movement of materials through a cell membrane using cellular energy. The main difference between passive transport and active transport is that **active transport requires the cell to use its own energy while passive transport does not**. Cells have several ways of moving materials by active transport. In one method, transport proteins in the cell membrane “pick up” molecules outside the cell and carry them in. Another method of active transport is engulfing, in which the cell membrane wraps around, or engulfs, a particle and forms a vacuole within the cell.

Most cells are very small. One reason is related to the fact that all materials move into and out of cells through the cell membrane. Once a molecule enters a cell, it is carried to its destination by a stream of moving cytoplasm. In a very large cell, streams of cytoplasm must travel farther to carry materials from the cell membrane to all parts of the cell.

Cell Structure and Function ▪ *Guided Reading and Study*

The Cell in Its Environment (pp. 32–37)

This section tells how things move into and out of cells.

Use Target Reading Skills

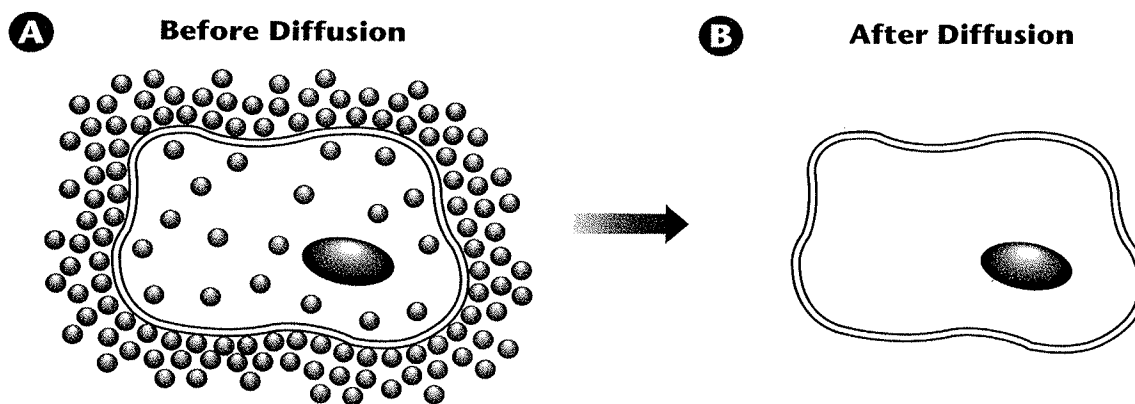
After you read the section, reread the paragraphs that contain definitions of Key Terms. Use all the information you have learned to write a definition of each Key Term in your own words.

Introduction (p. 32)

1. The cell membrane is _____, which means that some substances can pass through it while others cannot.

Diffusion (pp. 33–34)

2. List three ways that substances can move into and out of a cell.
 - a. _____
 - b. _____
 - c. _____
3. In diffusion, molecules move from an area of _____ concentration to an area of _____ concentration.
4. Draw molecules on Part B of the diagram below to show how the molecules are distributed inside and outside the cell after diffusion has occurred.



Cell Structure and Function ▪ *Guided Reading and Study*

Osmosis (pp. 34–35)

5. In _____, water molecules diffuse through a selectively permeable membrane.

Active Transport (pp. 36–37)

6. Two ways of moving things into and out of cells that do NOT need energy are _____ and _____.
Moving materials through a cell membrane without using energy is called _____ transport.
7. How does active transport differ from passive transport?

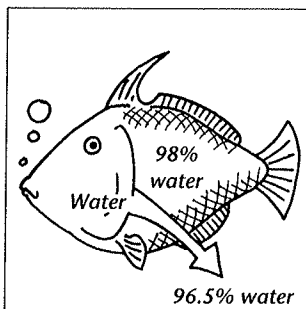
8. List two ways that the cell moves things by active transport.
a. _____
b. _____
9. Is the following sentence true or false? As a cell gets larger, it takes longer for a molecule that has entered the cell to reach the middle of the cell.

Cell Structure and Function ▪ Review and Reinforce

The Cell in Its Environment

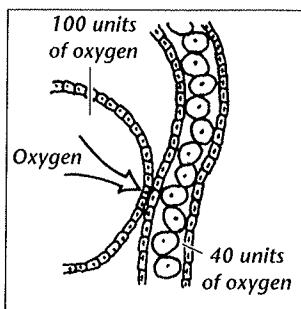
Understanding Main Ideas

Fill in the blank to identify the process illustrated in each of the following figures.



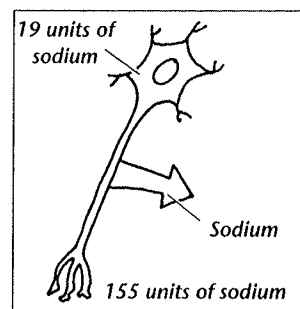
Water moves out of the cells of a saltwater fish and into the ocean.

1. _____



Oxygen moves from the lungs into the bloodstream.

2. _____



Sodium is pumped out of a nerve cell.

3. _____

Answer the following questions on a separate sheet of paper.

4. Explain how osmosis differs from diffusion.
5. Compare and contrast active and passive transport.
6. Identify two methods of active transport.
7. State one reason that cells are small.

Building Vocabulary

If the statement is true, write true. If the statement is false, change the underlined word or words to make the statement true.

- _____ 8. Selectively permeable means letting some but not all substances pass through.
- _____ 9. Osmosis is the process by which molecules tend to move from an area of higher concentration to an area of lower concentration.
- _____ 10. The process by which water moves across a selectively permeable membrane is called diffusion.
- _____ 11. Diffusion and osmosis are types of active transport.
- _____ 12. Passive transport requires the cell's own energy.

Cell Structure and Function • Key Terms**Key Terms**

Match each definition on the left with the correct term on the right. Then write the number of each term in the appropriate box below. When you have filled in all the boxes, add up the numbers in each column, row, and two diagonals. The sums should be the same. Some terms may not be used.

- | | |
|---|----------------------|
| A. Acts as the cell's control center | 1. cytoplasm |
| B. Area between the cell membrane and the nucleus | 2. active transport |
| C. The movement of materials through a cell membrane without using cellular energy | 3. microscope |
| D. An energy-rich compound such as sugar | 4. enzyme |
| E. Basic unit of structure and function in living things | 5. diffusion |
| F. Process by which molecules move from an area of higher concentration to one of lower concentration | 6. cell |
| G. Instrument that makes small objects look larger | 7. carbohydrate |
| H. Storage area of the cell | 8. nucleus |
| I. Protein that speeds up chemical reactions | 9. passive transport |
| | 10. mitochondria |
| | 11. vacuole |
| | 12. lipid |

A	B	C	↗ = _____ = _____ = _____ ↘ = _____
_____	_____	_____	
D	E	F	
_____	_____	_____	
G	H	I	
_____	_____	_____	
= _____	= _____	= _____	

Cell Structure and Function ▪ Connecting Concepts

Connecting Concepts

Develop a concept map that uses the Key Concepts and Key Terms from this chapter. Keep in mind the big idea of this chapter. The concept map shown is one way to organize how the information in this chapter is related. You may use an extra sheet of paper.

